RETENTION POND FOR FOREMOST FARMS
PRELIMINARY SOIL EXPLORATION REPORT

WAIMANALO, OAHU, HAWAII
TAX MAP KEY: 4-1-08

To:
AUSTIN, SMITH & ASSOCIATES, INCORPORATED

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

November 19, 1971

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE

3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

November 19, 1971

AUSTIN, SMITH & ASSOCIATES, INC.
745 Fort Street, Suite 900
Honolulu, Hawaii 96813

Gentlemen:

Subject: Retention Pond for Foremost Farms
Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08
Preliminary Soil Exploration

As requested, soil explorations were conducted to determine general soil conditions for the design of a berm for the proposed Retention Pond at Foremost Farms in Waimanalo, Oahu, Hawaii.

GENERAL SITE CONDITIONS

The proposed retention pond site is situated in a swale or shallow drainageway that slopes down toward the north at about 3% gradient.

The floor of the drainageway is fairly level with a surface layer of soft organic silts. Side slopes about 18 to 20 ft in height at about 20 to 25% gradient rise up to adjacent access roads along the east and west sides.

Wash water from cattle pens was flowing into the site from the south end at the time of the field explorations.

INTERPRETATION OF SOIL CONDITIONS

From the field explorations and laboratory test results, the soils may be generally described as follows:

A surface layer of about 1/2 ft to 1-1/2 ft or more of soft organic silts along the floor of the drainageway underlain by medium silty clays to about 13 to 19-ft depths followed by stiffer silty clays to 15 to 22 ft, the depths drilled.

Pockets of clay and decomposed rocks may be interspersed in the silty clay layers.

Water was noted in the borings at about 2 to 4.5-ft depths during the field explorations.

For more detailed descriptions of soils encountered in the borings, refer to the boring logs.

DISCUSSION AND RECOMMENDATIONS

The present plan is to construct a 15-ft high berm across the north end (low side) of a swale to create a retention pond on the grounds of Foremost Farms in Waimanalo.

Wash water from the cattle pens will be discharged into the pond. The waste water will then be pumped periodically from the pond into open pasture areas.

In general, the berm is to be constructed with on-site soils that will be excavated from the central area of the pond.

Slopes for Retention Pond

For the design of unlined earth slopes for the retention pond at the site, the following slopes are recommended:

Downstream slope of berm	- 3 horizontal to 1 vertical assuming internal drainage of the berm is provided.
Upstream slope of berm	- 6 horizontal to 1 vertical.
Side slopes inside of pond (excluding berm)	- 3 horizontal to 1 vertical assuming that the slopes will require some maintenance and repair wherever a slough occurs.

Site Grading

Some guidelines for grading follow:

1. The site should be cleared and grubbed. Surface vegetation and miscellaneous debris should be removed from the site.

2. Loose surface soils should be stripped from the berm area. Soft pockets should be excavated and backfilled with compacted select on-site soils to match the surrounding ground.

3. The subgrade should be compacted and shaped to drain before the start of berm construction.

4. A blanket of filter rock should be placed below the outer half of the berm with a vertical drainage path placed in the center of the berm. See Figure 1.

5. The berm may be constructed with select on-site soils from the pond excavation. In general, the surface layers of organic soils should be removed and the subsoils used for the construction of the berm.

   The outer shell of the upstream slope of the berm that is flatter than 3 to 1 slope may be constructed with the organic on-site material except that highly organic material such as grass and roots should be wasted.

6. Fills should be constructed in approximately level layers starting at the lower end and working upward.

7. Fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHO T-180-57 test method.

Overflow Line

The backfill around the overflow line should be well compacted.

Concrete collars should be used around the overflow pipe to minimize possible internal erosion of the backfill around the pipe.

The inlet, outlet and spillway sections should be lined with boulders. There should be a layer of filter rock between the natural soil and the boulder lining.

Maintenance

The inlets, outlets, berm and ponding basin should be maintained and repaired periodically, particularly before and after rainstorms.

Unforeseen Conditions

Unforeseen conditions such as soft spots or seepage water may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Attached are the boring logs, laboratory test results, limitations and a Boring Location Plan.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

Ezra Koike

Ezra Koike
Professional Engineer
Hawaii No. 1450

EK:vl

BORING LOGS

The stratification lines shown on each of the boring logs represent the approximate boundary between soil types and the transition may be gradual.

Symbols

Symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limit or sieve analysis test results.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RETENTION POND FOR FOREMOST FARMS
LOCATION: Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2" O.D. THIN WALL TUBE

BORING NO. 1 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date NOV. 1, 1971
Field Party MAESHIRO, RADOVICH, KAKU
Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"
Elev. 102' ± * Datum —
Drill Bit T.C. DRAG

Water Level	2.5'			
Time	2:35 PM			
Date	11-1-71			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 102' ± *?	0									
(MH)	MEDIUM, MOTTLED BROWN SILTY CLAY W/ ROOTS & DECOMPOSED ROCK		11-1-71 WATER	1-A	-	48	-	-	-		3/5' 4/5'
MH	MEDIUM, MOTTLED BROWN SILTY CLAY W/GRAY CLAY & DECOMPOSED ROCK	5		1-B	39	53	87	3640	1900		3/5' 4/5'
		10		1-C	-	45	-	2860	1500		3/5' 4/5'
MH	STIFF, MOTTLED BROWN SILTY CLAY W/TRACES OF GRAY, CLAY & DECOMPOSED ROCK	15		1-D	39	45	77	4420	1900		5/5' 10/5'
	END OF BORING @ 16'										

* ELEVATION ESTIMATED FROM "RETENTION POND PLAN" DATED 9/1/71

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RETENTION POND FOR FOREMOST FARMS
LOCATION: Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08

HAMMER:
Weight: 140*
Drop: 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE
2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 2 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date OCT. 29, 1971
Field Party SUZUKI, RADOVICH
Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"
Elev. 96' ± * Datum —
Drill Bit T.C. DRAG

Water Level	1.9' ±			
Time	3:30 PM			
Date	10-29-71			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 96' ± *?	0									
MH	MEDIUM TO STIFF MOTTLED BROWN CLAYEY SILT W/TRACES OF DECOMPOSED ROCK		2"SS WATER 10-29-71	2-A	45	58	100	-	-		
		5	2"S	2-B	42	50	93	2600	700		3/.5' 4/.5'
MH	MEDIUM, MOTTLED BROWN SILTY CLAY W/ DECOMPOSED ROCK & GRAY, CLAY POCKETS	10	2"S	2-C	-	62	-	-	-		1/.5' 2/.5'
(CH)	STIFF, GRAY, CLAY W/DECOMPOSED ROCK & BROWN, SILTY CLAY	15	2"S	2-D	-	54	-	4680	1000		4/.5' 5/.5'
	END OF BORING @ 16'										

* ELEVATION ESTIMATED FROM "RETENTION POND PLAN" DATED 9/1/71

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RETENTION POND FOR FOREMOST FARMS
LOCATION: Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE
2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 3 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date OCT. 28, 1971
Field Party SUZUKI, MAKAULA, RADOVICH
Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"
Elev. 92'± * Datum ____
Drill Bit T.C. DRAG

Water Level	5.2'±				
Time	4:00 PM				
Date	10-28-71				

Unified Soil Classification	DESCRIPTION ELEV. = 92'± *?	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/TRACES OF GRAY, CLAY	0	2"SS	3-A	-	37	-	-	-		
	10-28-71 WATER ▽	5	2"S	3-B	-	66	-	1660	500		1/.5' 3/.5'
(MH)	MEDIUM, MOTTLED BROWN SILTY CLAY W/TRACES OF GRAY, CLAY POCKETS & DECOMPOSED ROCK	10	2"S	3-C	-	58	-	3900	1000		2/.5' 4/.5'
		15	2"S	3-D	-	55	-	3640	1100		2/.5' 3/.5'
(MH)	MEDIUM TO STIFF MOTTLED BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK	20	2"SS	3-E	-	66	-	-	-		
	END OF BORING @ 21.5'										

* ELEVATION ESTIMATED FROM "RETENTION POND PLAN" DATED 9/1/71

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RETENTION POND FOR FOREMOST FARMS
LOCATION: Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE
2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 4 Sheet No. _____ of _____
Driller: W. LUM ASSOC., INC. Date: OCT. 29, 1971
Field Party: SUZUKI, RADOVICH
Type of Boring: AUGER (MOBILE MINUTEMAN) Diam.: 3"
Elev.: 90'± * Datum: —
Drill Bit: T.C. DRAG

Water Level	3.5'±			
Time	11:30 AM			
Date	10-29-71			

Unified Soil Classification	DESCRIPTION ELEV.= 90'±*2	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
MH	MEDIUM TO STIFF MOTTLED BROWN CLAYEY SILT W/ROOTS	0	2"SS	4-A	48	65	93	-	-		
			10-29-71 WATER								
(MH)	SOFT, GRAY-BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK	5	2"S	4-B	-	59	-	-	-		1/9' 1/3'
MH	MEDIUM TO STIFF MOTTLED BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK & GRAY, CLAY POCKETS	10	2"S	4-C	40	58	88	-	-		1/5' 3/5'
CH	STIFF, MOTTLED BROWN & GRAY, CLAY W/DECOMPOSED ROCK	15	2"S	4-D	41	49	101	3900	1200		3/5' 6/5'
		20	2"SS	4-E	-	54	-	-	-		
	END OF BORING @ 21.5'										

* ELEVATION ESTIMATED FROM "RETENTION POND PLAN" DATED 9/1/71

WALTER LUM ASSOCIATES, INC.  3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RETENTION POND FOR FOREMOST FARMS
LOCATION: Waimanalo, Oahu, Hawaii
Tax Map Key: 4-1-08

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE
2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 5 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date NOV. 1, 1971
Field Party MAESHIRO, KAKU, RADOVICH
Type of Boring AUGER (MOBILE MINUTEMAN) Diam. 3"
Elev. 94'± * Datum —
Drill Bit T.C. DRAG

Water Level				
Time	11:30 AM			
Date	11-1-71			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Plastic Limit	Water Cont. %	Liquid Limit	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 94'± *?										
(MH)	MEDIUM TO STIFF MOTTLED BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK		2"S	5-A	—	42	—	6240	1900+		4/.5' 7/.5'
			WATER 11-1-71								
		5									
(MH)	MEDIUM, MOTTLED BROWN SILTY CLAY W/DECOMPOSED ROCK & ORGANIC MATERIAL		2"SS	5-B	—	48	—	—	—		
		10									
CH	MEDIUM, BROWN & GRAY CLAY W/SOME DECOMPOSED ROCK		2"S	5-C	35	48	83	2860	1500		3/.5' 4/.5'
		15									
(MH)	MEDIUM, MOTTLED BROWN SILTY CLAY W/GRAY, CLAY & TRACES OF DECOMPOSED ROCK		2"S	5-D	-	64	-	8640	1900+		3/.5' 4/.5'
		20									
			2"S	5-E	-	55	-	-	-		3/.5' 4/.5'
	END OF BORING @ 21'										

*ELEVATION ESTIMATED FROM "RETENTION POND PLAN" DATED 9/1/71

RETENTION POND FOR FOREMOST FARMS

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	1	1		2
SAMPLE NO.	B	D		
DEPTH BELOW SURFACE	5'-6'	15'-16'		SURFACE
DESCRIPTION	MOTTLED BROWN SILTY CLAY W/GRAY CLAY & DECOMP. ROCK	MOTTLED BROWN SILTY CLAY W/TRACES OF GRAY CLAY & DECOMP. ROCK		BROWN & GRAY ORGANIC SILT W/GRASS
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		NATURAL
Liquid Limit	87	77		83
Plastic Limit	39	39		44
Plasticity Index	48	38		39
Dilatancy	NONE-SLOW	NONE-SLOW		MED.-QUICK
Toughness	MED.-HIGH	MED.-HIGH		MEDIUM
Dry Strength	MED.-HIGH	MEDIUM		SLIGHT-MED.
UNIFIED SOIL CLASSIFICATION	MH	MH		OH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-57 Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 11-18-71 By BT.

RETENTION POND FOR FOREMOST FARM

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	2	2		4
SAMPLE NO.	A	B		A
DEPTH BELOW SURFACE	0.5'-2'	5'-6'		0.5'-2'
DESCRIPTION	MOTTLED BROWN CLAYEY SILT W/TRACES OF DECOMP. ROCK	MOTTLED BROWN SILTY CLAY W/DECOMP. ROCK & GRAY CLAY POCKETS		MOTTLED BROWN CLAYEY SILT W/ROOTS
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		NATURAL
Liquid Limit	100	93		93
Plastic Limit	45	42		48
Plasticity Index	55	51		45
Dilatancy	SLOW-MED.	SLOW-MED.		SLOW-MED.
Toughness	MED.-HIGH	MED.-HIGH		MEDIUM
Dry Strength	MEDIUM	MED.-HIGH		MEDIUM
UNIFIED SOIL CLASSIFICATION	MH	MH		MH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-57 Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 11-18-71 By BT

RETENTION POND FOR FOREMOST FARMS

TABLE I c - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	4	4		5
SAMPLE NO.	C	D		C
DEPTH BELOW SURFACE	10'-11'	15'-16'		10'-11'
DESCRIPTION	MOTTLED BROWN SILTY CLAY W/TRACES OF DECOMP. ROCK & GRAY CLAY POCKETS	MOTTLED BROWN & GRAY CLAY W/DECOMP. ROCK		BROWN & GRAY CLAY W/SOME DECOMP. ROCK
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		NATURAL
Liquid Limit	88	101		83
Plastic Limit	40	41		35
Plasticity Index	48	60		48
Dilatancy	NONE-SLOW	SLOW-MED.		NONE
Toughness	MED.-HIGH	MED.-HIGH		HIGH
Dry Strength	MED.-HIGH	MED.-HIGH		HIGH
UNIFIED SOIL CLASSIFICATION	MH	CH-MH		CH
APPARENT SPECIFIC GRAVITY				
EXPANSION AND CBR TESTS (Surcharge-51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-57 Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

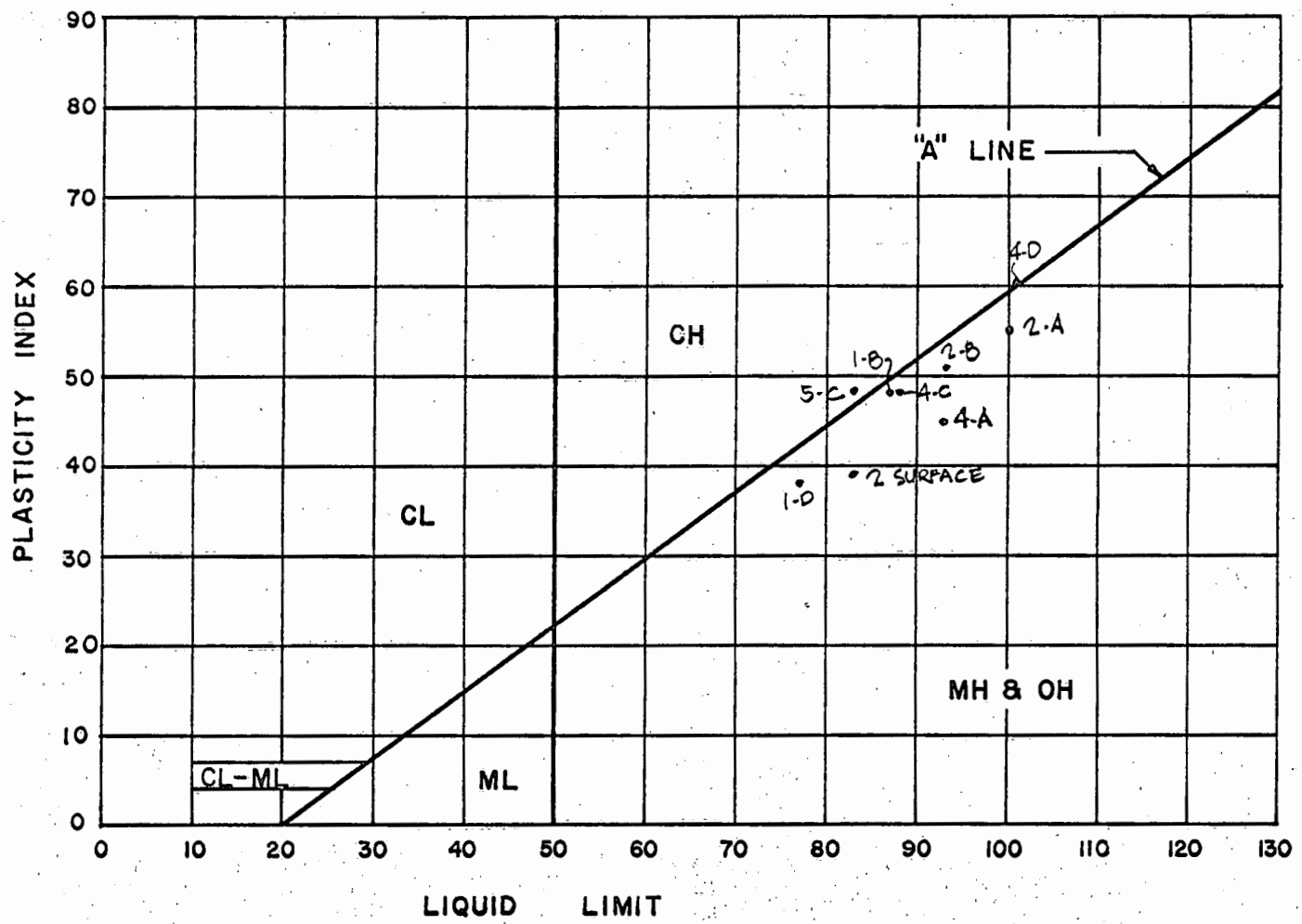
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 11-18-71 By BT

PLASTICITY CHART

PROJECT: RETENTION POND FOR FOREMOST FARMS

LOCATION: WAIMANALO, OAHU, HAWAII



DATE 11-18-71 BY BT.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

MOISTURE–DENSITY CURVE (AASHO T-180-57, METHOD A)

PROJECT: RETENTION POND FOR FOREMOST FARMS

LOCATION: WAIMANALO, OAHU, HAWAII

SAMPLE NO.: 2 SURFACE

SAMPLE DESCRIPTION: BROWN & GRAY ORGANIC SILT W/GRASS

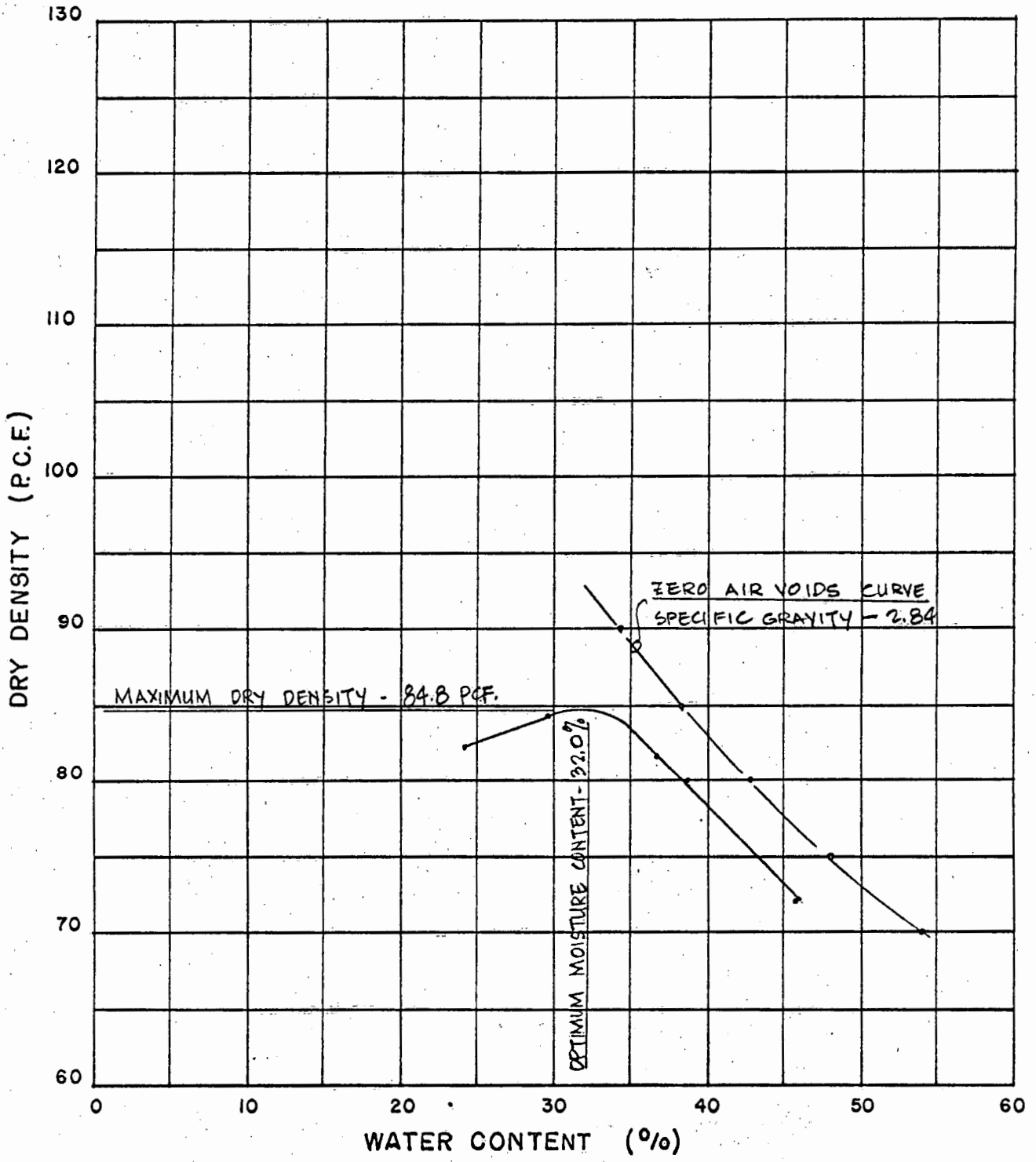
AGGREGATE: ¼" MINUS

MOLD SIZE: 4" Ø X 4.59" HIGH

HAMMER: 10 LBS., 18" DROP

LAYERS: 5

BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

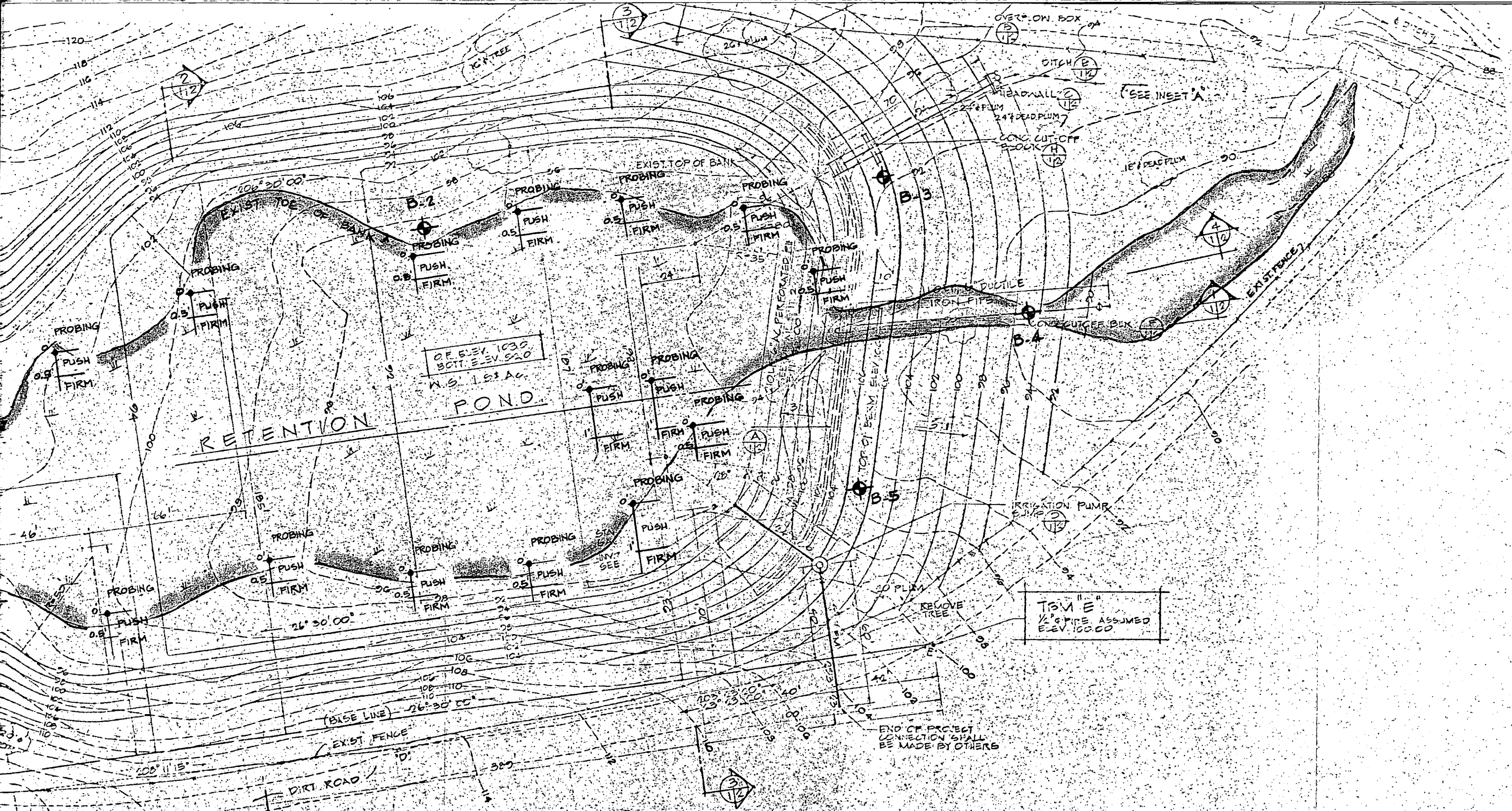
DATE 11-17-71 BY BT

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions at other locations or at other dates. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.



NOTE:
1. ALL AZIMUTHS SHOWN ARE BASED ON TRUE NORTH AS BETWEEN POINTS A AND B (180° 00' 00")

LEGEND

- APPROXIMATE LOCATION OF BORING
- APPROXIMATE LOCATION OF PROBING WITH "A-ROD"

BORING LOCATION PLAN
RETENTION POND FOR FOREMOST FARMS
WAIMANALO, OAHU, HAWAII
TAX MAP KEY: 4-1-08

Dr.	WALTER LUM ASSOCIATES, INC.	Sheet
Dsn. 11/71	3030 WAIALAE AVE.	
Rev.	CIVIL ENGINEERS	of
	PHONE 737-[illegible]	

PLAN
SCALE 1" = 20'

NOTE:
1. ALL AZIMUTHS SHOWN ARE BASED ON POINTS A AND B (SEE CO CO)

DIRT ROAD

EXIST FENCE

BASE LINE 26°-30'-00"

EXIST TOP OF BANK

EXIST TOE

RETENTION POND
W.S. 1514.5
OVERFLOW ELEV 1520
BOTT ELEV 1510

DITCH

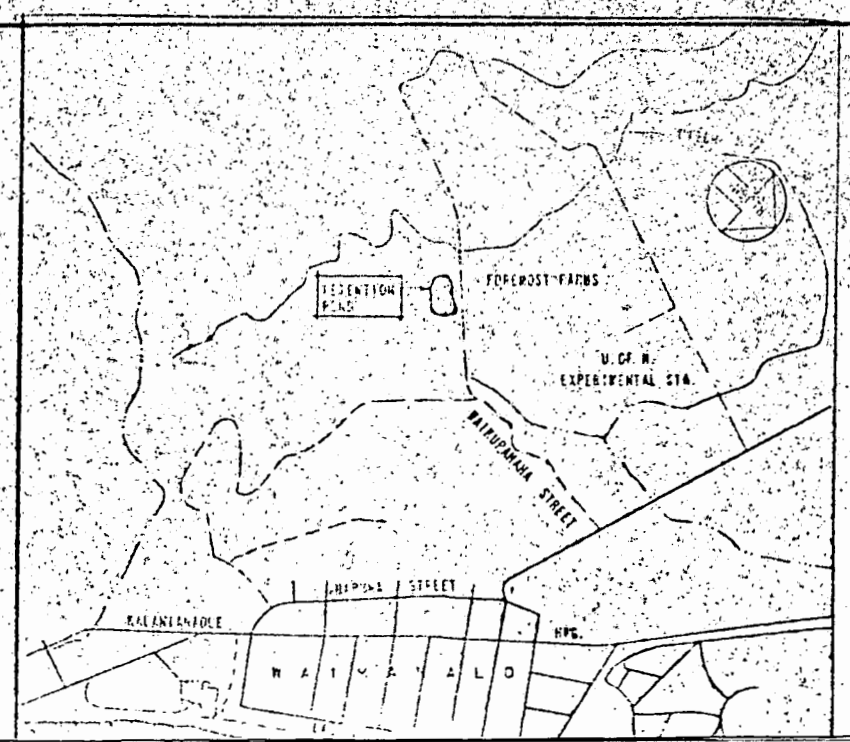
PROBING

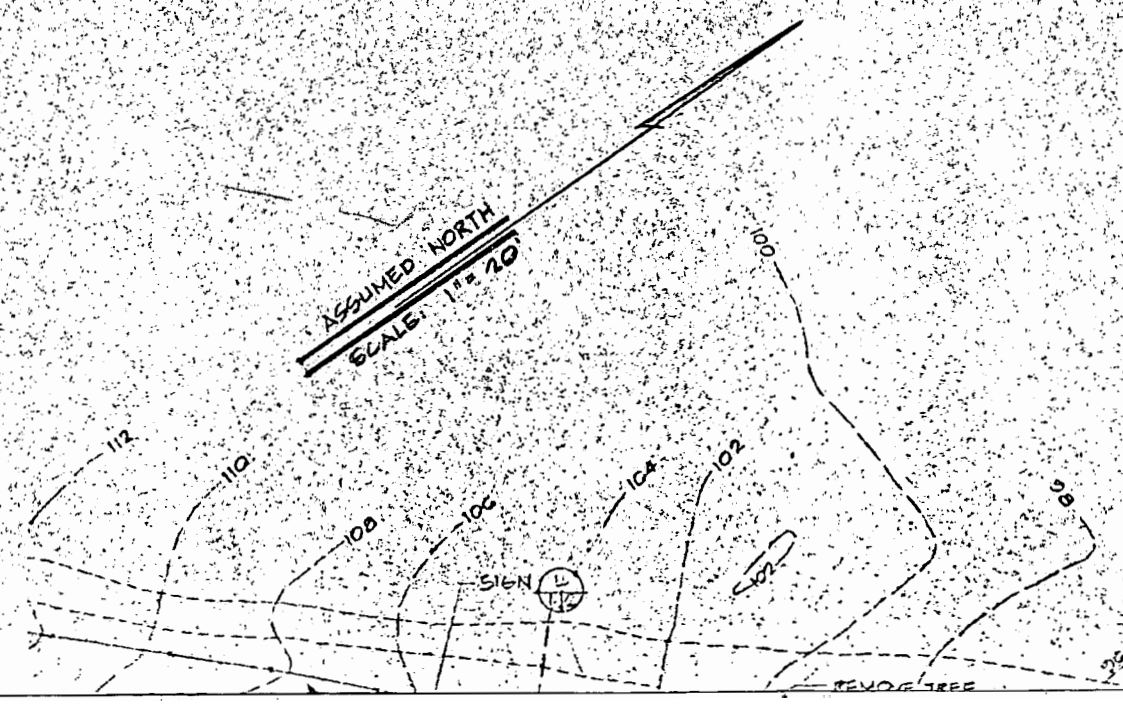
PUSH

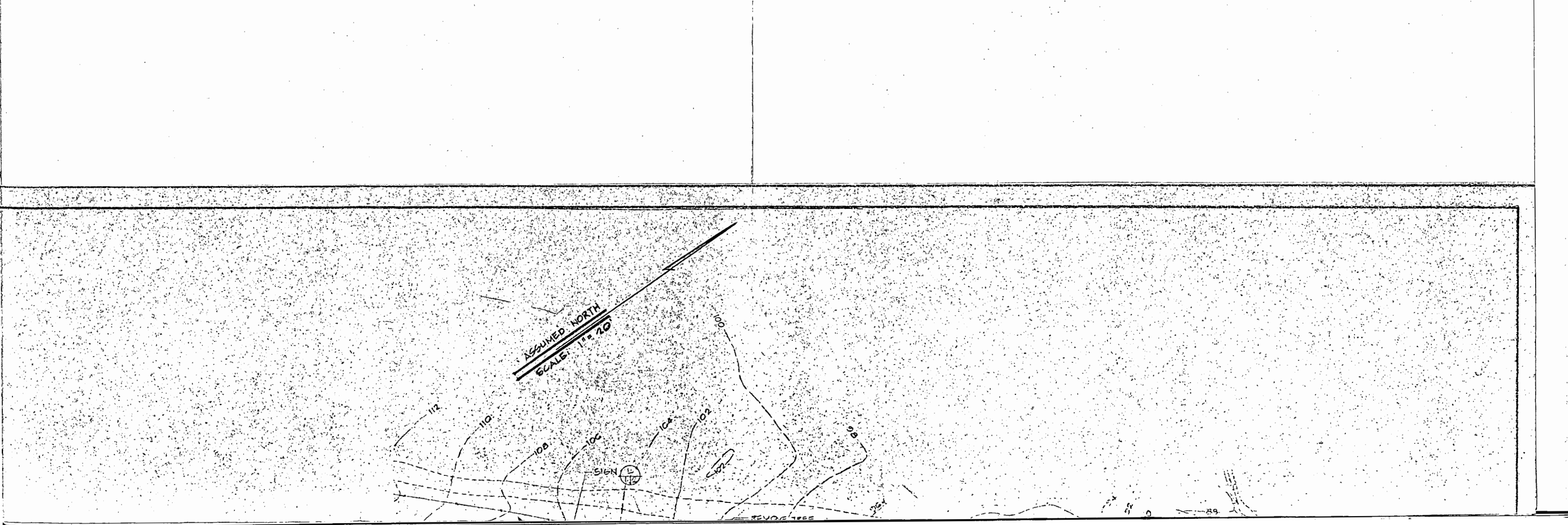
FIRM

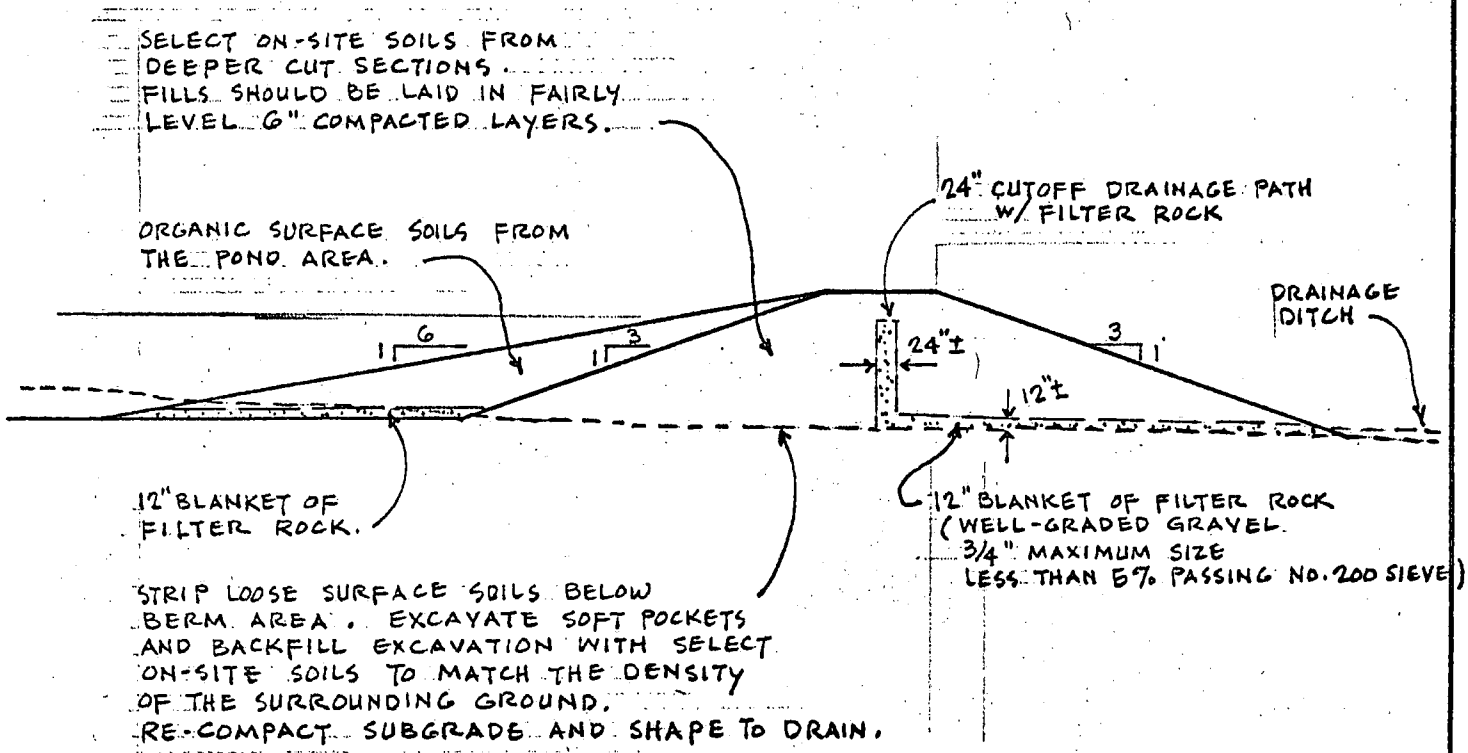
LOCATION PLAN
SCALE: 1" = 1000'

PACIFIC OCEAN


DETENTION POND
FOREMOST FARMS
U. OF H. EXPERIMENTAL STN.
MAKIKIHANA STREET
KAMEHAMEHA HIGHWAY
KALANIANAOLE
WAIKALUA


ASSUMED NORTH
SCALE 1" = 20'
112
110
108
106
104
102
100
98
SIGN
TENDS TREE


ASSUMED NORTH
SCALE: 1" = 20'
112
110
108
106
104
102
100
98
SIGN
TREE
0
20'



SUGGESTED SECTION THRU BERM

NOTE TO SCALE

FIGURE 1

RETENTION POND FOR FOREMOST FARMS

WAIMANALO, OAHU, HAWAII

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS